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=> d his

     (FILE 'HOME' ENTERED AT 11:10:43 ON 07 JAN 2004)

     FILE 'MEDLINE, EMBASE, BIOSIS, BIOTECHDS, SCISEARCH, HCAPLUS, NTIS,
     LIFESCI' ENTERED AT 11:11:16 ON 07 JAN 2004
L1            11 S GLYCOSYL (A) SULFOTRANSFERASE?
L2             8 DUP REM L1 (3 DUPLICATES REMOVED)
L3             2 S "GST4 ALPHA"
L4             1 DUP REM L3 (1 DUPLICATE REMOVED)
L5            53 S "GST4"
L6            10 S HUMAN (A)L5
L7             2 DUP REM L6 (8 DUPLICATES REMOVED)
L8         13789 S SULFOTRANSFERASE?
L9          5827 S HUMAN AND L8
L10      6311680 S CLON? OR EXPRESS? OR RECOMBINANT
L11         2771 S L9 AND L10
L12        13955 S "L-SELECTIN"
L13        19920 S "P-SELECTIN"
L14        31224 S L12 OR L13
L15          124 S L11 AND L14
L16           77 DUP REM L15 (47 DUPLICATES REMOVED)
L17        59143 S "GLYCAM-1" OR "CD34" OR "MADCAM-1" OR "SGP200"
L18           16 S L16 AND L17
L19           16 DUP REM L18 (0 DUPLICATES REMOVED)
                 E ROSEN S/AU
L20         2356 S E3
                 E LEE J/AU
L21        13300 S E3
                 E HEMMERICH S/AU
L22          118 S E3
L23        15770 S L21 OR L20 OR L22
L24            3 S L5 AND L23
L25            1 DUP REM L24 (2 DUPLICATES REMOVED)
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LOGINID:SSSPTA1652MXM

PASSWORD:
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* * * * * * * * * *   Welcome to STN International   * * * * * * * * * *

 NEWS  1           Web Page URLs for STN Seminar Schedule - N. America
 NEWS  2           "Ask CAS" for self-help around the clock
 NEWS  3  SEP 09   CA/CAplus records now contain indexing from 1907 to the
                   present
 NEWS  4  DEC 08   INPADOC: Legal Status data reloaded
 NEWS  5  SEP 29   DISSABS now available on STN
 NEWS  6  OCT 10   PCTFULL: Two new display fields added
 NEWS  7  OCT 21   BIOSIS file reloaded and enhanced
 NEWS  8  OCT 28   BIOSIS file segment of TOXCENTER reloaded and enhanced
 NEWS  9  NOV 24   MSDS-CCOHS file reloaded
 NEWS 10  DEC 08   CABA reloaded with left truncation
 NEWS 11  DEC 08   IMS file names changed
 NEWS 12  DEC 09   Experimental property data collected by CAS now available
                   in REGISTRY
 NEWS 13  DEC 09   STN Entry Date available for display in REGISTRY and CA/CAplus
 NEWS 14  DEC 17   DGENE: Two new display fields added
 NEWS 15  DEC 18   BIOTECHNO no longer updated
 NEWS 16  DEC 19   CROPU no longer updated; subscriber discount no longer
                   available
 NEWS 17  DEC 22   Additional INPI reactions and pre-1907 documents added to CAS
                   databases
 NEWS 18  DEC 22   IFIPAT/IFIUDB/IFICDB reloaded with new data and search fields
 NEWS 19  DEC 22   ABI-INFORM now available on STN

 NEWS EXPRESS  DECEMBER 28 CURRENT WINDOWS VERSION IS V7.00, CURRENT
               MACINTOSH VERSION IS V6.0b(ENG) AND V6.0Jb(JP),
               AND CURRENT DISCOVER FILE IS DATED 23 SEPTEMBER 2003
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 NEWS INTER    General Internet Information
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 NEWS PHONE    Direct Dial and Telecommunication Network Access to STN
 NEWS WWW      CAS World Wide Web Site (general information)

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=> file medline embase biosis biotechds scisearch hcaplus ntis lifesci
COST IN U.S. DOLLARS                                SINCE FILE      TOTAL
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                                                    ENTRY    SESSION
FULL ESTIMATED COST                                  0.21       0.21

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FILE 'LIFESCI' ENTERED AT 11:11:16 ON 07 JAN 2004
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=> s glycosyl (a) sulfotransferase?
L1          11 GLYCOSYL (A) SULFOTRANSFERASE?

=> dup rem l1
PROCESSING COMPLETED FOR L1
L2             8 DUP REM L1 (3 DUPLICATES REMOVED)

=> d 1-8 ibib ab

L2    ANSWER 1 OF 8  BIOTECHDS COPYRIGHT 2004 THOMSON DERWENT/ISI on STN
ACCESSION NUMBER: 2003-11055  BIOTECHDS
TITLE:            New mycobacterial peptide, useful for the manufacture of a
                  medicament for treating or preventing, or a diagnostic
                  reagent for identifying, mycobacterial infection;
                     vector plasmid-mediated recombinant protein gene transfer
                     and expression in host cell for use in recombinant vaccine
                     preparation against bacterium infection
AUTHOR:           JAMES B W; MARSH P; HAMPSHIRE T
PATENT ASSIGNEE:  MICROBIOLOGICAL RES AUTHORITY
PATENT INFO:      WO 2003004520 16 Jan 2003
APPLICATION INFO: WO 2002-GB3052 4 Jul 2002
PRIORITY INFO:    GB 2001-23993 5 Oct 2001; GB 2001-16385 4 Jul 2001
DOCUMENT TYPE:    Patent
LANGUAGE:         English
OTHER SOURCE:     WPI: 2003-210338 [20]
AB    DERWENT ABSTRACT:
      NOVELTY - Isolated mycobacterial peptide (I) or its fragment, derivative
      or variant, encoded by a mycobacterial gene, is new.
           DETAILED DESCRIPTION - (I), encoded by a mycobacterial gene (II),
      whose expression is induced or up-regulated under culture conditions that
      are nutrient-starving and that maintain mycobacterial latency. The
      conditions are obtainable by batch fermentation of a mycobacterium for at
      least 20 days post-inoculation, when compared with culture conditions
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that are not nutrient-starving and that support exponential growth of the mycobacterium. INDEPENDENT CLAIMS are also included for the following: (1) identifying the mycobacterial gene; (2) an inhibitor of (I); (3) an antibody that binds to (I); (4) an attenuated mycobacterium in which a gene has been modified, which renders the mycobacterium substantially non-pathogenic; (5) an attenuated mycobacterial carrier comprising (I); (6) a DNA plasmid; (7) an RNA sequence encoded by (II); (8) an RNA vector; and (9) treating or preventing mycobacterial infection.

BIOTECHNOLOGY - Preferred Vector: The vector preferably comprises: (a) the RNA sequence encoded by (II); and (b) an integration site for a chromosome of a host cell. Preferred Inhibitor: The inhibitor is capable of preventing or inhibiting the mycobacterial peptide from exerting its native biological effect. It consists of: (a) an antibiotic capable of targeting the induced or up-regulated mycobacterial gene or its gene product; or (b) an antisense or triplex-forming nucleic acid sequence that is complementary to at least part of the inducible or up-regulatable gene. The inhibitor is capable of inhibiting a protein comprising 2-nitropropane dioxygenase, acetyltransferase, oxidoreductase, transcriptional regulator, acyl transferase, UDP-glucose dehydrogenase, phosphoribosylglycinamide formyltransferase, glutathione reductase, dihydrolipoamide, transposase, proline iminopeptidase, prolyl aminopeptidase, quinolone efflux pump, glycine betaine transporter, phosphatidylethanolamine N-methyltransferase, chalcone synthase 2, **sulfotransferase**, **glycosyl** transferase, fumarate reductase flavoprotein, aminotransferase class-II pyridoxal-phosphate, bacteriophage HK97 prohead protease, penicillin-binding protein, fatty acyl-CoA racemase, nitrilotriacetate monooxygenase, histidine kinase response regulator or hydroxymethyldihydropterine pyrophosphokinase. Preferred Gene: The gene to be modified has a wild-type coding sequence corresponding to a sequence comprising 210-4377 base pairs, fully disclosed in the specification. Preferred Carrier: The attenuated mycobacterial carrier is attenuated Salmonella, vaccine virus, fowlpox virus or Mycobacterium bovis (e.g. BCG strain). Preferred Plasmid: The DNA plasmid comprises: (a) a promoter; (b) a polyadenylation signal; and (c) a sequence that is the coding sequence of the mycobacterial gene.The promoter is cytomegalovirus and/or SV40 promoters. The polyadenylation signal consists of SV40 or bovine growth hormone polyadenylation signals. The DNA plasmid comprises 210-4377 bp. Preferred Method: Identifying the mycobacterial gene comprises: (a) culturing a first mycobacterium under culture conditions that are nutrient-starving and that maintain mycobacterial latency, where the conditions are obtainable by batch fermentation of a mycobacterium for at least 20 days post-inoculation; (b) culturing a second mycobacterium under culture conditions that are not-nutrient starving and that support exponential growth of the second mycobacterium; (c) obtaining first and second mRNA populations from the first and second mycobacteria, respectively, where the first mRNA population is obtained from the first mycobacterium and where the second mRNA is obtained from the second mycobacterium; (d) preparing first and second cDNA populations from the first and second mRNA populations, respectively, during which cDNA preparation, a detectable label is introduced into the cDNA molecules of the first and second cDNA populations; (e) isolating corresponding first and second cDNA molecules from first and second cDNA populations, respectively; (f) comparing relative amounts of label or corresponding signal emitted from the label present in the isolated first and second cDNA molecules; (g) identifying a greater amount of label or signal provided by the isolated first cDNA molecule than that provided by the isolated second cDNA molecule; and (h) identifying the first cDNA and the corresponding mycobacterial gene that is induced or up-regulated during culture of a mycobacterium under latency conditions. The corresponding first and second cDNA molecules are isolated from the first and second cDNA populations, respectively, by hybridization to an array plate containing immobilized amplified DNA sequences that have been generated from mycobacterial genomic DNA. The immobilized sequences are representative of each known gene of the

mycobacterial genome. Each representative sequence is immobilized at an identified location on the plate. The first mycobacterium is cultured under culture conditions defined by a dissolved oxygen tension of less than 10%, preferably less than 7 or 5%, air saturation when measured at 37degreesC. It is harvested at least 30, preferably 40 days post-inoculation. The culture conditions are carbon-starving to the growth of the mycobacteria. A relative induction or up-regulation is identified by a relative 3-fold, preferably 4-fold increase in the amount of label or signal provided by the isolated first cDNA molecule over that provided by the isolated second cDNA molecule. Treating or preventing mycobacterial infection comprises administering to the patient the peptide, inhibitor, antibody, attenuated mycobacterium or microbial carrier, DNA sequence or plasmid, or RNA sequence or vector.

ACTIVITY - Antibacterial. No biological data given.

MECHANISM OF ACTION - Vaccine.

USE - The peptide, inhibitor, antibody, attenuated mycobacterium or microbial carrier, DNA sequence or plasmid, or RNA sequence or vector is useful for the manufacture of a medicament for treating or preventing, or of a diagnostic reagent for identifying, mycobacterial infection (claimed).

ADMINISTRATION - The medicament is administered via intravenous, intraperitoneal or intranasal routes. No dosage given.

EXAMPLE - No relevant examples given. (440 pages)

L2 ANSWER 2 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
DUPLICATE 1

ACCESSION NUMBER: 2002:281104 BIOSIS
DOCUMENT NUMBER: PREV200200281104
TITLE: Method of determining whether an agent modulates **glycosyl sulfotransferase**-3.
AUTHOR(S): Bistrup, Annette [Inventor]; Rosen, Steven D. [Inventor, Reprint author]; Tangemann, Kirsten [Inventor]; Hemmerich, Stefan [Inventor]
CORPORATE SOURCE: San Francisco, CA, USA
ASSIGNEE: The Regents of the University of California
PATENT INFORMATION: US 6365365 April 02, 2002
SOURCE: Official Gazette of the United States Patent and Trademark Office Patents, (Apr. 2, 2002) Vol. 1257, No. 1. http://www.uspto.gov/web/menu/patdata.html. e-file. CODEN: OGUPE7. ISSN: 0098-1133.
DOCUMENT TYPE: Patent
LANGUAGE: English
ENTRY DATE: Entered STN: 8 May 2002
Last Updated on STN: 8 May 2002

AB A novel human glycosylsulfotransferase expressed in high endothelial cells (GST-3) and polypeptides related thereto, as well as nucleic acid compositions encoding the same, are provided. The subject polypeptides and nucleic acid compositions find use in a variety of applications, including research, diagnostic, and therapeutic agent screening applications. Also provided are methods of inhibiting selectin mediated binding events and methods of treating disease conditions associated therewith, particularly by administering an inhibitor of at least one of GST-3 or KSGal6ST, or homologues thereof.

L2 ANSWER 3 OF 8 BIOTECHDS COPYRIGHT 2004 THOMSON DERWENT/ISI on STN
ACCESSION NUMBER: 2001-06117 BIOTECHDS
TITLE: New **glycosyl-sulfotransferases** (GST)-4-alpha, GST-4-beta and GST-6 for diagnostic and therapeutic agent screening applications; vector-mediated gene transfer, expression in host cell, monoclonal antibody and transgenic animal for selectin binding-inhibitor, drug screening and disease therapy, diagnosis and gene therapy
AUTHOR: Rosen S D; Lee J K; Hemmerich S

PATENT ASSIGNEE: Univ.California
LOCATION: Oakland, CA, USA.
PATENT INFO: WO 2001006015 25 Jan 2001
APPLICATION INFO: WO 2000-US19741 19 Jul 2000
PRIORITY INFO: US 2000-593828 13 Jul 2000; US 1999-144694 20 Jul 1999
DOCUMENT TYPE: Patent
LANGUAGE: English
OTHER SOURCE: WPI: 2001-138471 [14]

AB A **glycosyl-sulfotransferase** (GST) (I) selected from the group GST-4-alpha, GST-4-beta and GST-6, is claimed. Also claimed are: a fragment of (I); a DNA (II) encoding (I); a DNA or its mimetic that hybridizes to (II) or its complementary sequence; an expression cassette (III) containing a transcriptional initiation region functional in an expression host and (II) under the transcriptional regulation of the transcriptional initiation region and a transcriptional termination region; a host cell (IV) containing (III); the cellular progeny of (IV); a method of producing (I); a monoclonal antibody that specifically binds to (I); and a non-human transgenic animal model for gene function, where the animal contains an introduced alteration in a gene encoding (I). (I) is useful for inhibiting a binding event between a selectin and a selectin ligand, which involves contacting the selectin with a non-sulfated selectin ligand. (II) encoding (I) is also useful in gene therapy to treat disorders such as acute or chronic inflammation and transplant tissue rejection and also for disease diagnosis. (44pp)

L2 ANSWER 4 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
ACCESSION NUMBER: 2001:427531 BIOSIS
DOCUMENT NUMBER: PREV200100427531
TITLE: Glycosly sulfortransferase-3.
AUTHOR(S): Bistrup, Annette [Inventor, Reprint author]; Rosen, Steven D. [Inventor]; Hemmerich, Stefan [Inventor]
CORPORATE SOURCE: San Francisco, CA, USA
ASSIGNEE: The Regents of the University of California; Syntex, Inc.,, Palo Alto, CA, USA
PATENT INFORMATION: US 6265192 July 24, 2001
SOURCE: Official Gazette of the United States Patent and Trademark Office Patents, (July 24, 2001) Vol. 1248, No. 4. e-file. CODEN: OGUPE7. ISSN: 0098-1133.
DOCUMENT TYPE: Patent
LANGUAGE: English
ENTRY DATE: Entered STN: 12 Sep 2001
Last Updated on STN: 22 Feb 2002

AB A novel human glycosylsulfotransferase expressed in high endothelial cells (GST-3) and polypeptides related thereto, as well as nucleic acid compositions encoding the same, are provided. The subject polypeptides and nucleic acid compositions find use in a variety of applications, including research, diagnostic, and therapeutic agent screening applications. Also provided are methods of inhibiting selectin mediated binding events and methods of treating disease conditions associated therewith.

L2 ANSWER 5 OF 8 BIOTECHDS COPYRIGHT 2004 THOMSON DERWENT/ISI on STN
ACCESSION NUMBER: 2000-00104 BIOTECHDS
TITLE: Human and mouse **glycosyl-sulfotransferase** -3 and related polynucleotides; expression in mammalian host cell and antibody, used for disease diagnosis and gene therapy
AUTHOR: Bistrup A; Rosen S D; Tangemann K; Hemmerich S
PATENT ASSIGNEE: Univ.California; Syntex
LOCATION: Oakland, CA, USA; Palo Alto, CA, USA.
PATENT INFO: WO 9949018 30 Sep 1999
APPLICATION INFO: WO 1999-US4316 26 Feb 1999
PRIORITY INFO: US 1998-190911 12 Nov 1998; US 1998-45284 20 Mar 1998
DOCUMENT TYPE: Patent

LANGUAGE: English
OTHER SOURCE: WPI: 1999-580442 [49]
AB **Glycosyl-sulfotransferase**-3 (GST-3, 386 or 388 amino acids) present in other than its natural environment, is new. Also claimed are: a nucleic acid (2,032 or 1,893 bp) which encodes GST-3; an expression cassette under the control of initiation sequences and termination sequences; a host cell; a method of producing GST-3; a monoclonal antibody; a method for inhibiting the binding of a selectin and a selectin ligand; a method of inhibiting a selectin mediated binding event in a mammalian host; a method of modulating a symptom of a disease condition associated with a selectin mediated binding event; a method of diagnosing a disease state related to the abnormal levels of a sulfotransferase chosen from GST-3 and KSGal6ST; a method of determining whether an agent is capable of modulating the activity of a sulfotransferase chosen from GST-3 and KSGal6ST; and a non-human transgenic animal model for gst-3 gene function. The nucleic acid sequences, DNA probes and DNA primers derived from these, proteins and antibodies are useful in detecting homologs. The products are useful in the diagnosis of diseases associated with selectin binding interactions. (59pp)

L2 ANSWER 6 OF 8 SCISEARCH COPYRIGHT 2004 THOMSON ISI on STN
ACCESSION NUMBER: 1998:906629 SCISEARCH
THE GENUINE ARTICLE: 137GQ
TITLE: Cloning and characterization of a human **glycosyl sulfotransferase** that is restricted to high endothelial venules and confers expression of the L-selectin recognition epitope 6-sulfo sialyl Lewis X.
AUTHOR: Bistrup A (Reprint); Bakhta S; Tangemann K; Lee J K; Gunn M D; Belov Y Y; Kannagi R; Hemmerich S; Rosen S D
CORPORATE SOURCE: UNIV CALIF SAN FRANCISCO, SAN FRANCISCO, CA 94143; ROCHE BIOSCI, PALO ALTO, CA; AIICHI CAN RES INST, NAGOYA, AICHI, JAPAN
COUNTRY OF AUTHOR: USA; JAPAN
SOURCE: MOLECULAR BIOLOGY OF THE CELL, (NOV 1998) Vol. 9, Supp. [S], pp. 718-718.
Publisher: AMER SOC CELL BIOLOGY, PUBL OFFICE, 9650 ROCKVILLE PIKE, BETHESDA, MD 20814.
ISSN: 1059-1524.
DOCUMENT TYPE: Conference; Journal
FILE SEGMENT: LIFE
LANGUAGE: English
REFERENCE COUNT: 0

L2 ANSWER 7 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
ACCESSION NUMBER: 1999:17006 BIOSIS
DOCUMENT NUMBER: PREV199900017006
TITLE: Cloning and characterization of a human **glycosyl sulfotransferase** that is restricted to high endothelial venules and confers expression of the L-selectin recognition epitope 6-sulfo sialyl Lewis X.
AUTHOR(S): Bistrup, Annette [Reprint author]; Bakhta, Sunil; Tangemann, Kirsten; Lee, Jin Kyu; Gunn, Michael D.; Belov, Yevgeniy Y.; Kannagi, Reiji; Hemmerich, Stefan; Rosen, Steven D.
CORPORATE SOURCE: Univ. Calif., San Francisco, CA, USA
SOURCE: Molecular Biology of the Cell, (Nov., 1998) Vol. 9, No. SUPPL., pp. 124A. print.
Meeting Info.: 38th Annual Meeting of the American Society for Cell Biology. San Francisco, California, USA. December 12-16, 1998. American Society for Cell Biology.
CODEN: MBCEEV. ISSN: 1059-1524.
DOCUMENT TYPE: Conference; (Meeting)
Conference; Abstract; (Meeting Abstract)

LANGUAGE: English
ENTRY DATE: Entered STN: 20 Jan 1999
Last Updated on STN: 20 Jan 1999

L2 ANSWER 8 OF 8 SCISEARCH COPYRIGHT 2004 THOMSON ISI on STN
ACCESSION NUMBER: 1998:810754 SCISEARCH
THE GENUINE ARTICLE: 130CC
TITLE: Cloning and functional characterization of a human **glycosyl sulfotransferase**, that is highly restricted to high endothelial venules and confers expression of the L-selectin recognition epitope 6-sulfo sialyl Lewis x.
AUTHOR: Hemmerich S (Reprint); Bistrup A; Bakhta S; Gunn M D; Kannagi R; Rosen S D
CORPORATE SOURCE: ROCHE BIOSCI, PALO ALTO, CA; UNIV CALIF SAN FRANCISCO, SAN FRANCISCO, CA 94143; AIICHI CANC RES INST, NAGOYA, AICHI, JAPAN
COUNTRY OF AUTHOR: USA; JAPAN
SOURCE: GLYCOBIOLOGY, (NOV 1998) Vol. 8, No. 11, pp. 29-29.
Publisher: OXFORD UNIV PRESS, GREAT CLARENDON ST, OXFORD OX2 6DP, ENGLAND.
ISSN: 0959-6658.
DOCUMENT TYPE: Conference; Journal
FILE SEGMENT: LIFE
LANGUAGE: English
REFERENCE COUNT: 0

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FILE 'MEDLINE, EMBASE, BIOSIS, BIOTECHDS, SCISEARCH, HCAPLUS, NTIS, LIFESCI' ENTERED AT 11:11:16 ON 07 JAN 2004
L1 11 S GLYCOSYL (A) SULFOTRANSFERASE?
L2 8 DUP REM L1 (3 DUPLICATES REMOVED)

=> s "gst4 alpha"
L3 2 "GST4 ALPHA"

=> dup rem l3
PROCESSING COMPLETED FOR L3
L4 1 DUP REM L3 (1 DUPLICATE REMOVED)

=> d all

L4 ANSWER 1 OF 1 EMBASE COPYRIGHT 2004 ELSEVIER INC. ALL RIGHTS RESERVED.
on STN DUPLICATE 1
AN 2002402885 EMBASE
TI Enzymatic synthesis in vitro of the disulfated disaccharide unit of corneal keratan sulfate.
AU Akama T.O.; Misra A.K.; Hindsgaul O.; Fukuda M.N.
CS T.O. Akama, Glycobiology Program, Burnham Institute, 10901 N. Torrey Pines Rd., San Diego, CA 92037, United States. takama@burnham-inst.org
SO Journal of Biological Chemistry, (8 Nov 2002) 277/45 (42505-42513).
Refs: 54
ISSN: 0021-9258 CODEN: JBCHA3
CY United States
DT Journal; Article
FS 029 Clinical Biochemistry
LA English
SL English
AB Among the enzymes of the carbohydrate sulfotransferase family, human corneal GlcNAc 6-O-sulfotransferase (hCGn6ST, also known as human

GlcNAc6ST-5/GST4.beta.) and human intestinal GlcNAc 6-O-sulfotransferase (hIGn6ST or human GlcNAc6ST-3/**GST4.alpha.**) are highly homologous. In the mouse, intestinal GlcNAc 6-O-sulfotransferase (mIGn6ST or mouse GlcNAc6ST-3/GST4) is the only orthologue of hCGn6ST and hIGn6ST. In the previous study, we found that hCGn6ST and mIGn6ST, but not hIGn6ST, have sulfotransferase activity to produce keratan sulfate (Akama, T. O., Nakayama, J., Nishida, K., Hiraoka, N., Suzuki, M., McAuliffe, J., Hindsgaul, O., Fukuda, M., and Fukuda, M. N. (2001) J. Biol. Chem. 276, 16271-16278). In this study, we analyzed the substrate specificities of these sulfotransferases in vitro using synthetic carbohydrate substrates. We found that all three sulfotransferases can transfer sulfate to the nonreducing terminal GlcNAc of short carbohydrate substrates. Both hCGn6ST and mIGn6ST, but not hIGn6ST, transfer sulfate to longer carbohydrate substrates that have poly-N-acetyllactosamine structures, suggesting the involvement of hCGn6ST and mIGn6ST in production of keratan sulfate. To clarify further the involvement of hCGn6ST in biosynthesis of keratan sulfate, we reconstituted the biosynthetic pathway in vitro by sequential enzymatic treatment of a synthetic carbohydrate substrate. Using four enzymes, .beta.1,4-galactosyltransferase-I, .beta.1,3-N-acetylglucosaminyl-transferase-2, hCGn6ST, and keratan sulfate Gal 6-O-sulfotransferase, we were able to synthesize in vitro a product that conformed to the basic structural unit of keratan sulfate. Based on these results, we propose a biosynthetic pathway for N-linked keratan sulfate on corneal proteoglycans.

CT Medical Descriptors:
*protein synthesis
*enzyme mechanism
protein family
cornea
sequence homology
amino acid sequence
enzyme activity
enzyme substrate
enzyme specificity
in vitro study
biosynthesis
protein structure
human
human cell
article
priority journal
Drug Descriptors:
*disaccharide
*keratan sulfate
sulfotransferase
sulfate
poly n acetylactosamine
beta 1,4 galactosyltransferase 1
beta 1,3 n acetylglucosaminyltransferase 2
keratan sulfate galactosyl 6 o sulfotransferase
transferase
proteoglycan
unclassified drug

RN (keratan sulfate) 69992-87-6, 9056-36-4; (sulfotransferase) 9023-09-0; (sulfate) 14808-79-8; (transferase) 9047-61-4

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FILE 'MEDLINE, EMBASE, BIOSIS, BIOTECHDS, SCISEARCH, HCAPLUS, NTIS, LIFESCI' ENTERED AT 11:11:16 ON 07 JAN 2004

L1 11 S GLYCOSYL (A) SULFOTRANSFERASE?

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L2              8 DUP REM L1 (3 DUPLICATES REMOVED)
L3              2 S "GST4 ALPHA"
L4              1 DUP REM L3 (1 DUPLICATE REMOVED)

=> s "GST4"
L5             53 "GST4"

=> s human (a)l5
L6             10 HUMAN (A) L5

=> dup rem l6
PROCESSING COMPLETED FOR L6
L7              2 DUP REM L6 (8 DUPLICATES REMOVED)

=> d 1-2 ibib ab

L7   ANSWER 1 OF 2     MEDLINE on STN                    DUPLICATE 1
ACCESSION NUMBER:    2001205848     MEDLINE
DOCUMENT NUMBER:     21096027   PubMed ID: 11181564
TITLE:               Chromosomal localization and genomic organization for the
                     galactose/ N-acetylgalactosamine/N-acetylglucosamine
                     6-O-sulfotransferase gene family.
AUTHOR:              Hemmerich S; Lee J K; Bhakta S; Bistrup A; Ruddle N R;
                     Rosen S D
CORPORATE SOURCE:    Department of Respiratory Diseases, Roche Bioscience, Palo
                     Alto, CA 94304, USA.
CONTRACT NUMBER:     RO1GM5741 (NIGMS)
SOURCE:              GLYCOBIOLOGY, (2001 Jan) 11 (1) 75-87.
                     Journal code: 9104124. ISSN: 0959-6658.
PUB. COUNTRY:        England: United Kingdom
DOCUMENT TYPE:       Journal; Article; (JOURNAL ARTICLE)
LANGUAGE:            English
FILE SEGMENT:        Priority Journals
OTHER SOURCE:        GENBANK-AF176838; GENBANK-AF280086; GENBANK-AF280087;
                     GENBANK-AF280088; GENBANK-AF280089; GENBANK-AI824100
ENTRY MONTH:         200106
ENTRY DATE:          Entered STN: 20010611
                     Last Updated on STN: 20010611
                     Entered Medline: 20010607
AB   The galactose/N-acetylgalactosamine/N-acetylglucosamine
     6-O-sulfotransferases (GSTs) are a family of Golgi-resident enzymes that
     transfer sulfate from 3'phosphoadenosine 5'phospho-sulfate to the
     6-hydroxyl group of galactose, N-acetylgalactosamine, or
     N-acetylglucosamine in nascent glycoproteins.  These sulfation
     modifications are functionally important in settings as diverse as
     cartilage structure and lymphocyte homing.  To date six members of this
     gene family have been described in human and in mouse.  We have determined
     the chromosomal localization of these genes as well as their genomic
     organization.  While the broadly expressed enzymes implicated in
     proteoglycan biosynthesis are located on different chromosomes, the highly
     tissue specific enzymes GST-3 and 4 are encoded by genes located both in
     band q23.1--23.2 on chromosome 16.  In the mouse, both genes reside in the
     syntenic region 8E1 on chromosome 8.  This cross-species conserved
     clustering is suggestive of related functional roles for these genes.  The
     human GST4 locus actually contains two highly similar
     open reading frames (ORF) that are 50 kb apart and encode two highly
     similar enzyme isoforms termed GST-4 alpha and GST-4 beta.  All genes
     except GST0 (chondroitin 6-O-sulfotransferase) contain intron-less ORFs.
     With one exception these are fused directly to sequences encoding the 3'
     untranslated regions (UTR) of the respective mature mRNAs.  The 5' UTRs of
     these mRNAs are usually encoded by a number of short exons 5' of the
     respective ORF. 5'UTRs of the same enzyme expressed in different cell
     types are sometimes derived from different exons located upstream of the
     ORF.  The genomic organization of the GSTs resembles that of certain
```

glycosyltransferase gene families.

L7 ANSWER 2 OF 2 MEDLINE on STN DUPLICATE 2
ACCESSION NUMBER: 95251394 MEDLINE
DOCUMENT NUMBER: 95251394 PubMed ID: 7733673
TITLE: Cloning and expression of a cDNA for mu-class glutathione S-transferase from rabbit liver.
AUTHOR: Lee S H; Lee S H; Han J S; Kim Y S; Koh J K
CORPORATE SOURCE: Department of Biochemistry, College of Medicine, Hanyang University, Seoul, Korea.
SOURCE: ARCHIVES OF BIOCHEMISTRY AND BIOPHYSICS, (1995 Apr 20) 318 (2) 424-9.
Journal code: 0372430. ISSN: 0003-9861.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
OTHER SOURCE: GENBANK-L23766
ENTRY MONTH: 199505
ENTRY DATE: Entered STN: 19950608
Last Updated on STN: 19980206
Entered Medline: 19950526

AB A mu-class glutathione S-transferase (GST) cDNA clone, pHMB1, from rabbit liver has been constructed, using a 748-base-pair fragment of GST Yb1 cDNA as a probe. The nucleotide sequence of pHMB1 has been determined, and the complete amino acid sequence has been deduced. Recombinant clone pHMB1 contains a cDNA insert of 1443 base pairs with 654 nucleotides of open reading frame, 33 nucleotides of 5'-untranslated region, and 756 nucleotides of 3'-untranslated region. The open reading frame encodes a polypeptide (rbGST mu I) comprising 218 amino acids with molecular weight of 25,417. Compared to published mu-class GST sequences, rbGST mu I is 73 and 77% identical to rat Yb1 and **human GST4** in amino acid sequence, respectively. The pHMB1 was expressed in Escherichia coli using expression vector pIH821 and the expressed GST was purified as a single band on polyacrylamide gel electrophoresis by maltose- and glutathione-affinity column chromatography. Rabbit liver GST protein expressed by this system was catalytically active. The functional characterization was done on the expressed protein. The rabbit liver GST expressed in E. coli showed greater activity toward 1,2-dichloro-4-nitrobenzene than mu-class isozymes in rabbit hepatic tissue (T. Primiano and R.F. Novak (1993) Arch. Biochem. Biophys. 301, 404-410). Enzymatic activity of expressed protein toward the substrate 1-chloro-2,4-dinitrobenzene was inhibited by triethyltin bromide, Cibacron blue, triphenyltin chloride, bromosulfophthalein, and hematin. RNA blot hybridization demonstrated that the pHMB1 mRNA was well expressed in rabbit liver, brain, and kidney.

=> d his

(FILE 'HOME' ENTERED AT 11:10:43 ON 07 JAN 2004)

FILE 'MEDLINE, EMBASE, BIOSIS, BIOTECHDS, SCISEARCH, HCAPLUS, NTIS, LIFESCI' ENTERED AT 11:11:16 ON 07 JAN 2004
L1 11 S GLYCOSYL (A) SULFOTRANSFERASE?
L2 8 DUP REM L1 (3 DUPLICATES REMOVED)
L3 2 S "GST4 ALPHA"
L4 1 DUP REM L3 (1 DUPLICATE REMOVED)
L5 53 S "GST4"
L6 10 S HUMAN (A)L5
L7 2 DUP REM L6 (8 DUPLICATES REMOVED)

=> s sulfotransferase?
L8 13789 SULFOTRANSFERASE?

```
=> s human and l8
L9         5827 HUMAN AND L8

=> s clon? or express? or recombinant
   4 FILES SEARCHED...
L10     6311680 CLON? OR EXPRESS? OR RECOMBINANT

=> s l9 and l10
L11        2771 L9 AND L10

=> s "l-selectin"
L12       13955 "L-SELECTIN"

=> s "p-selectin"
L13       19920 "P-SELECTIN"

=> s l12 or l13
L14       31224 L12 OR L13

=> s l11 and l14
L15         124 L11 AND L14

=> dup rem l15
PROCESSING COMPLETED FOR L15
L16          77 DUP REM L15 (47 DUPLICATES REMOVED)

=> s "GLYCAM-1" or "CD34" or "MAdCAM-1" or "Sgp200"
L17       59143 "GLYCAM-1" OR "CD34" OR "MADCAM-1" OR "SGP200"

=> s l16 and l17
L18          16 L16 AND L17

=> dup rem l18
PROCESSING COMPLETED FOR L18
L19          16 DUP REM L18 (0 DUPLICATES REMOVED)

=> d 1-16 ibib ab

L19  ANSWER 1 OF 16  HCAPLUS  COPYRIGHT 2004 ACS on STN
ACCESSION NUMBER:         2002:251882  HCAPLUS
DOCUMENT NUMBER:          136:291000
TITLE:                    Screening of novel human glycosyl
                          sulfotransferase expressed in high
                          endothelial cells (HEC) (GST-3, HEC-GlcNAc6ST)
                          inhibitors
INVENTOR(S):              Bistrup, Annette; Rosen, Steven D.; Tangemann,
                          Kirsten; Hemmerich, Stefan
PATENT ASSIGNEE(S):       The Regents of the University of California, USA
SOURCE:                   U.S., 38 pp., Cont.-in-part of U.S. Ser. No. 45,284.
                          CODEN: USXXAM
DOCUMENT TYPE:            Patent
LANGUAGE:                 English
FAMILY ACC. NUM. COUNT:   2
PATENT INFORMATION:

     PATENT NO.        KIND  DATE           APPLICATION NO.   DATE
     ---------------   ----  --------       ---------------   --------
     US 6365365         B1   20020402       US 1998-190911    19981112
     US 6265192         B1   20010724       US 1998-45284     19980320
     CA 2322779         AA   19990930       CA 1999-2322779   19990226
     WO 9949018         A1   19990930       WO 1999-US4316    19990226
         W:  AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE,
             DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP,
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KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

AU 9927945	A1	19991018	AU 1999-27945	19990226
AU 764852	B2	20030904		
EP 1062326	A1	20001227	EP 1999-908538	19990226
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
JP 2002507409	T2	20020312	JP 2000-537979	19990226
US 2001051370	A1	20011213	US 2001-816825	20010322
US 2002164748	A1	20021107	US 2001-7262	20011108

PRIORITY APPLN. INFO.:

US 1998-45284	A2	19980320
US 1998-190911	A	19981112
WO 1999-US4316	W	19990226

AB Use of a novel **human** glycosyl **sulfotransferase** **expressed** in high endothelial cells (HEC) (GST-3 or HEC-GlcNAc6ST) for screening inhibitors as therapeutic agent is provided. Full-length cDNAs contg. the two contigs and predicting CS6T/KSST homologs were obtained by screening a **human** fetal brain .lambda.ZAP cDNA library (Stratagene, La Jolla, Calif.) with labeled 700-800 bp restriction fragments (from EST 2 for contig 1 and from EST 5 for contig 2). The proteins encoded by these cDNAs were designated as GST 1 and GST 2, where GST denotes "glycosylsulfotransferase." GST 1 has been independently **cloned** and assigned the name "KSGal6ST by Fukuta et al., J. Biol. Chem. (1997) 272: 32321-8. ESTs potentially coding for novel **human** glycosyl **sulfotransferases** other than GST-1&2 were identified through a secondary homol. screen, in which the peptide sequences of GST-1 and GST-2 were used as template in two parallel TBLASTN searches against a public (dbest) and a private genomic database (Lifeseq, Incyte Pharmaceuticals, Palo Alto, Calif.). Three cDNA **clones** which encode three different **human** homologs for C6ST/KSST have been obtained. The predicted GST proteins are type 2 membrane proteins 411, 484, and 386 amino acids in length, resp. Each has a relatively short transmembrane domain and a short amino terminal cytoplasmic tail. GST-1 is the same as the **sulfotransferase** reported by Fukuta et al. supra (1997) and named KSGal6ST. GST-3 (HEC-GlcNAc6ST), is a novel GlcNAc-6-**sulfotransferase**. The novel **human** glycosylsulfotransferase enzyme of the subject invention has been named **human** glycosyl **sulfotransferase** 3 or huGST-3 or HEC-GlcNAc6ST. HuGST-3 is capable of sulfating selectin ligands, particularly **L-selectin** ligands, e.g., **GlyCAM** **-1**. Donor compds. from which huGST-3 obtains sulfate groups for transfer to acceptor ligand compds. include 3'-phosphoadenosine 5'-phosphosulfate (PAPS) and the like. Selectin ligands capable of being sulfated through huGST-3 action include E-, P- and **L-** **selectin** ligands, particularly **L-selectin** ligands, such as **GlyCAM-1**, **CD34**, **MAdCAM-1**, **Sgp200**, podocalyxin, and the like. huGST-3 is strongly predicted to have GlcNAc6-O-**sulfotransferase** (N-actylglucosamine-6-O-**sulfotransferase**) activity. **Human** GST-3 is a 386 amino acid protein having an amino acid sequence as shown in FIG. 1 and identified as SEQ ID NO:01.

REFERENCE COUNT: 37 THERE ARE 37 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L19 ANSWER 2 OF 16 MEDLINE on STN
ACCESSION NUMBER: 2002463169 MEDLINE
DOCUMENT NUMBER: 22194291 PubMed ID: 12068018
TITLE: Distinct sulfation requirements of selectins disclosed using cells that support rolling mediated by all three

selectins under shear flow. **L-selectin** prefers carbohydrate 6-sulfation totyrosine sulfation, whereas **p-selectin** does not.

AUTHOR: Kanamori Akiko; Kojima Naoya; Uchimura Kenji; Muramatsu Takashi; Tamatani Takuya; Berndt Michael C; Kansas Geoffrey S; Kannagi Reiji

CORPORATE SOURCE: Program of Molecular Pathology, Aichi Cancer Center, Research Institute, Nagoya 464-8681, Japan.

CONTRACT NUMBER: HL55647 (NHLBI)

SOURCE: JOURNAL OF BIOLOGICAL CHEMISTRY, (2002 Sep 6) 277 (36) 32578-86.
Journal code: 2985121R. ISSN: 0021-9258.

PUB. COUNTRY: United States

DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)

LANGUAGE: English

FILE SEGMENT: Priority Journals

ENTRY MONTH: 200210

ENTRY DATE: Entered STN: 20020912
Last Updated on STN: 20030105
Entered Medline: 20021029

AB l- and **P-selectin** are known to require sulfation in their ligand molecules. We investigated the significance of carbohydrate 6-sulfation and tyrosine sulfation in selectin-mediated cell adhesion. COS-7 cells were genetically engineered to **express P-selectin** glycoprotein ligand-1 (PSGL-1) or its mutant in various combinations with 6-O-**sulfotransferase** (6-Sul-T) and/or alpha1-->3fucosyltransferase VII (Fuc-T VII). The cells transfected with PSGL-1, 6-Sul-T, and Fuc-T VII cDNAs supported rolling mediated by all three selectins and provided the best experimental system so far to estimate kinetic parameters in selectin-mediated cell adhesion for all three selectins using the identical rolling substrate and to compare the ligand specificity of each selectin. **L-selectin** -mediated rolling was drastically impaired if the cells lacked carbohydrate 6-sulfation elaborated by 6-Sul-T, but not affected when PSGL-1 was replaced with a mutant lacking three tyrosine residues at its NH(2) terminus. **L-selectin**-mediated adhesion was also hardly affected by mocarhagin treatment of the cells, which cleaved a short peptide containing sulfated tyrosine residues from PSGL-1. In contrast, **P-selectin**-mediated rolling was abolished when PSGL-1 was either mutated or cleaved by mocarhagin at its NH(2) terminus, whereas the cells **expressing** PSGL-1 and Fuc-T VII but not 6-Sul-T showed only a modest decrease in **P-selectin** -mediated adhesion. These results indicate that **L-selectin** prefers carbohydrate 6-sulfation much more than tyrosine sulfation, whereas **P-selectin** favors tyrosine sulfation in the PSGL-1 molecule far more than carbohydrate 6-sulfation. E-selectin-mediated adhesion was sulfation-independent requiring only Fuc-T VII, and thus the three members of the selectin family have distinct requirements for ligand sulfation.

L19 ANSWER 3 OF 16 BIOTECHDS COPYRIGHT 2004 THOMSON DERWENT/ISI on STN

ACCESSION NUMBER: 2002-06107 BIOTECHDS

TITLE: New enzyme, useful for modifying acceptor molecule, comprises an isolated **L-selectin** **sulfotransferase**-2 that directs **expression** of **L-selectin** ligand antigen, MECA-79 in Chinese hamster ovary cells, or intestinal GlcNAc 6-**sulfotransferase**;
plasmid pcDNA1.1/LSST-2-mediated enzyme gene transfer and **expression** in host cell for **recombinant** protein production in CHO cell for Crohn disease, ulcerative colitis, skin inflammatory disorder, allergic contact dermatitis,psoriasis, Lichen planus, lymphoma, chronic pneumonia, delayed-type hypersensitivity reaction,

diabetes and hyperplastic thymus therapy

AUTHOR: FUKUDA M; YEH J; HIRAOKA N
PATENT ASSIGNEE: BURNHAM INST
PATENT INFO: WO 2001085177 15 Nov 2001
APPLICATION INFO: WO 2000-US15452 11 May 2000
PRIORITY INFO: US 2000-569320 11 May 2000
DOCUMENT TYPE: Patent
LANGUAGE: English
OTHER SOURCE: WPI: 2002-075226 [10]

AB DERWENT ABSTRACT:

NOVELTY - An isolated polypeptide (I) comprising an amino acid sequence encoding **L-selectin sulfotransferase**-2 (LSST-2) or its active fragment that directs **expression** of a **L-selectin** ligand antigen, MECA-79 in Chinese hamster ovary (CHO) cells, or comprising a sequence encoding intestinal GlcNAc 6-**sulfotransferase** (I-GLcNAc6ST), is new.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following: (1) treating or preventing (M) an **L-selectin** -mediated condition in a subject, comprising reducing the **expression** or activity of a beta1, 3-N-acetylglucosaminyl transferase (beta1, 3GnT) that directs **expression** of a MECA-79 antigen; (2) an isolated **L-selectin** antagonist (II) comprising an extended core 1 structure comprising the oligosaccharide Galbeta1-4(SO3-6)GlcNAcbeta1-3Galbeta1-3GalNAc; and (3) an isolated nucleic acid molecule (III) comprising a sequence encoding (I).

WIDER DISCLOSURE - Disclosed as new are the following: (A) an isolated polypeptide which contains an amino acid sequence encoding a beta1, 3GnT, or its active fragment, that directs **expression** of a MECA-79 antigen in CHO cells; (B) a substantially purified antibody material that specifically binds LSST-2, I-GLcNAc6ST or beta1, 3GnT; (C) an isolated antisense nucleic acid molecule which contains a sequence that specifically binds to a sequence comprising 1333 or 1937 base pairs fully defined in the specification; (D) an oligonucleotide which contains a nucleotide sequence having at least 10 contiguous nucleotides of a sequence comprising 1333 or 1937 base pairs fully defined in the specification, or a nucleotide sequence complementary to it; (E) a vector containing a nucleic acid molecule encoding LSST-2; and (F) a host cell containing the above-mentioned vector.

BIOTECHNOLOGY - Preferred Polypeptide: LSST-2 produces MECA-79 antigen, when co-transfected into CHO cells together with beta1, 3GnT. I-GLcNAc6ST in combination with beta1, 3GnT produces MECA-79 antigen in Lec-2 cells, but not in CHO cells. Preferred Antagonist: (II) comprises two or more of the oligosaccharide Galbeta1-4(SO3-6)GlcNAcbeta1-3Galbeta1-3GalNAc, or two or more of the oligosaccharide NeuNAcalpha2-3Galbeta1-4(sulfo-6(Fucalpha1-3)GlcNAc)beta1-3Galbeta1-3GalNAcalpha1. Preferred Method: (M) involves administering to the subject an oligosaccharide **L-selectin** antagonist that inhibits the binding of **L-selectin** to a MECA-79 antigen, an inhibitory antibody material that specifically binds beta1, 3GnT, or a beta1, 3GnT antisense nucleic acid molecule comprising 20 nucleotides complementary to a sequence of 1208 or 1337 base pairs fully defined in the specification. (M) further comprises reducing the **expression** or activity of LSST-2 in the subject.

ACTIVITY - Antiinflammatory; antiulcer; antipsoriatic; antidiabetic; dermatological; antiallergic. No biological data provided.

MECHANISM OF ACTION - Inhibitor of binding of **L-selectin** to MECA-79 antigen (claimed). Inhibition of **L-selectin** ligand antigen (MECA-79) antibody binding by synthetic oligosaccharide such as Galbeta1-4(SO3-6)GlcNAcbeta1-3Galbeta1-3GalNAc was tested. Synthetic oligosaccharides were mixed at the indicated concentrations with MECA-79 antibody. The mixtures were incubated at room temperature for one hour before addition to wells precoated with transfected media from CHO/**CD34**/FT7/LSST/core 1 extension beta1, 3-N-acetylglucosaminyl transferase (beta1, 3GnT) cells. Antibody

binding was assayed. The results showed that the 6-S-extended core 1 structure, Galbeta1-4(SO3-6)GlcNAcbeta1-3Galbeta1-3GalNAc, was active in inhibiting binding of anti-MECA-79 antibody.

USE - (M) is useful for treating or preventing an **L-selectin**-mediated condition in a subject (claimed). (I) is useful for modifying an acceptor molecule by contacting the acceptor molecule with (I) or its active fragment. (III) is useful for treating **L-selectin** mediated conditions such as Crohn's disease and ulcerative colitis, inflammatory disorders of the skin such as allergic contact dermatitis, psoriasis and Lichen planus, lymphomas, chronic pneumonia, delayed-type hypersensitivity reactions, diabetes and hyperplastic thymus.

ADMINISTRATION - No administration details are given.

EXAMPLE - A nucleic acid molecule encoding **human L-selectin** ligand **sulfotransferase**-2 (LSST-2), which, together with the beta1-3-N-acetylglucosaminyl transferase (beta1, 3GnT), directed **expression** of the **L-selectin** ligand antigen, MECA-79, was isolated. **Human** genomic DNA was used as the template for polymerase chain reaction (PCR)-based **cloning**. Primers corresponding to nucleotides 891-910 and nucleotides 1327-1302 of mouse LSST-1 were used to amplify **human** genomic DNA. The amplified products were **cloned** into pBluescript by TA **cloning**. The resultant coding sequence was 79.2% identical to mouse LSST-1 at the nucleotide level. To **clone** the full-length LSST-2 coding sequence, a P1 phage library of a **human** genomic DNA was amplified using primers 5'-CCGAATTCTCCCGAGAACGCACAAAG-3' and 5'-CCCAAGCTTCTCATAGAGCACAAGCAG-3. From the single positive **clone**, DNA was purified and sequenced directly. The coding sequence present on the single exon was confirmed by reverse transcriptase (RT)-PCR using poly(A)+ RNA isolated from **human** lymph node. Three pairs of primers used in these PCR reactions corresponded to 5'-TTGGCCAGAAGGGGAATAG-3' (S1), 5'-CCACTGAAAGAGGCTGGACTGT-3'(S2), 5'-GGTTCTGTCTTCCTGGCGCTC-3' (S3), 5'-TTTGGCAGATGACCTGCATCAC-3' (S4), 5'-AGAACGCACAAAGGAGATCTCA-3' (S5), and 5'-AGATGTAGGCAAGGCTCAGAAG-3'(S6). PCR with the S1 and S2 resulted in the expected characteristic fragment of 470 base pairs, PCR with S3 and S4 resulted in the expected characteristic fragment of 617 base pairs, and PCR with S5 and S6 resulted in the expected characteristic fragment of 600 base pairs. The cDNA containing full-length coding sequence of **human** LSST-2 was excised by XbaI and TfiI, blunt-ended and **cloned** into pcDNA1.1. The resulting LSST-2 **expression** vector, in which the LSST-2 coding sequence was **expressed** under control of the CMV promoter, was designated pcDNA1.1/LSST-2. (98 pages)

L19 ANSWER 4 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER:	2001:64196 HCAPLUS
DOCUMENT NUMBER:	134:127828
TITLE:	**Cloning** of nucleic acid sequences encoding **human** and murine glycosyl **sulfotransferases**
INVENTOR(S):	Rosen, Steven D.; Lee, Jin Kyu; Hemmerich, Stefan
PATENT ASSIGNEE(S):	Regents of the University of California, USA
SOURCE:	PCT Int. Appl., 128 pp. CODEN: PIXXD2
DOCUMENT TYPE:	Patent
LANGUAGE:	English
FAMILY ACC. NUM. COUNT:	1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001006015	A1	20010125	WO 2000-US19741	20000719

W: AU, CA, JP
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL,

PT, SE
EP 1210455 A1 20020605 EP 2000-948806 20000719
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY
JP 2003505039 T2 20030212 JP 2001-511223 20000719
PRIORITY APPLN. INFO.: US 1999-144694P P 19990720
US 2000-593828 A 20000713
WO 2000-US19741 W 20000719

AB Novel glycosyl **sulfotransferases** (GST-4.alpha., GST-4.beta., and GST-6 from **human**; GST-4 and GST-6 from mouse) and polypeptides related thereto, as well as nucleic acid compns. encoding the same, are provided. The glycosyl **sulfotransferases** are type 2 membrane proteins having a relatively short transmembrane domain and N-terminal cytoplasmic tail of varying length, and are capable of sulfating selectin ligands, particularly **L-selectin** ligands (e.g., **GlyCAM-1**). Genomic DNA sequences encoding **human** GST-4 and GST-6 and for mouse GST-6 are also provided. The subject polypeptides and nucleic acid compns. find use in a variety of applications, including various diagnostic and therapeutic agent screening applications. Also provided are methods of inhibiting selectin-mediated binding events and methods of treating disease conditions assocd. therewith, particularly by administering an inhibitor of at least one of GST-4.alpha., GST-4.beta., and GST-6.

REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L19 ANSWER 5 OF 16 EMBASE
on STN
ACCESSION NUMBER: 2001194520 EMBASE
TITLE: Structural and functional features of the **CD34** antigen: An update.
AUTHOR: Lanza F.; Healy L.; Sutherland D.R.
CORPORATE SOURCE: D.R. Sutherland, University Health Network, Princess Margaret Hospital, Dept. of Med. Oncology/Hematology, 610 University Avenue, Toronto, Ont. M5G 2M9, Canada. rob.sutherland@utoronto.ca
SOURCE: Journal of Biological Regulators and Homeostatic Agents, (2001) 15/1 (1-13).
Refs: 95
ISSN: 0393-974X CODEN: JBRAER
COUNTRY: Italy
DOCUMENT TYPE: Journal; General Review
FILE SEGMENT: 025 Hematology
026 Immunology, Serology and Transplantation
029 Clinical Biochemistry
LANGUAGE: English
SUMMARY LANGUAGE: English

AB **CD34** is a heavily glycosylated type I transmembrane molecule, that can be phoshorylated by a variety of kinases including Protein kinase C and Tyrosine kinases. The classification of epitopes detected by different **CD34** MAbs has aided the selection of appropriate antibodies for use in specific clinical and research laboratory settings. Detailed structural analyses and **cloning** studies have confirmed that **CD34** is a sialomucin, and have suggested that the fine composition of the carbohydrate moieties contained in its extended N-terminal region is important in determining its interactions with a variety of different ligands. For high endothelial venules (HEV) **CD34** to serve as a ligand for **L-selectin**, the O-linked glycans of HEV **CD34** are modified in an exquisitely specific manner with a variety of sialyl- and sulfo-transferases. In contrast, **CD34** is not the ligand for **L-selectin** in hematopoietic stem/progenitor cells (HSPCs) and despite much endeavour, ligands for hematopoietic **CD34** remain to be identified.

L19 ANSWER 6 OF 16 SCISEARCH COPYRIGHT 2004 THOMSON ISI on STN
ACCESSION NUMBER: 2001:39518 SCISEARCH
THE GENUINE ARTICLE: 386BD
TITLE: Sulfation of N-acetylglucosamine by chondroitin 6-**sulfotransferase** 2 (GST-5)
AUTHOR: Bhakta S; Bartes A; Bowman K G; Kao W M; Polsky I; Lee J K; Cook B N; Bruehl R E; Rosen S D; Bertozzi C R; Hemmerich S (Reprint)
CORPORATE SOURCE: Thios Biotechnol, 828 Clayton St, San Francisco, CA 94117 USA (Reprint); Roche Biosci, Dept Resp Dis, Palo Alto, CA 94304 USA; Univ Calif Berkeley, Dept Chem, Berkeley, CA 94720 USA; Univ Calif Berkeley, Dept Mol & Cell Biol, Berkeley, CA 94720 USA; Univ Calif Berkeley, Howard Hughes Med Inst, Berkeley, CA 94720 USA; Univ Calif San Francisco, Dept Anat, San Francisco, CA 94143 USA; Univ Calif San Francisco, Program Immunol, San Francisco, CA 94143 USA
COUNTRY OF AUTHOR: USA
SOURCE: JOURNAL OF BIOLOGICAL CHEMISTRY, (22 DEC 2000) Vol. 275, No. 51, pp. 40226-40234.
Publisher: AMER SOC BIOCHEMISTRY MOLECULAR BIOLOGY INC, 9650 ROCKVILLE PIKE, BETHESDA, MD 20814 USA.
ISSN: 0021-9258.
DOCUMENT TYPE: Article; Journal
LANGUAGE: English
REFERENCE COUNT: 43

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Based on sequence homology with a previously **cloned** **human** GlcNAc 6-O-**sulfotransferase**, we have identified an open reading frame (ORF) encoding a novel member of the Gal/GalNAc/GlcNAc 6-O-**sulfotransferase** (GST) family termed GST-5 on the **human** X chromosome (band Xp11). GST-5 has recently been characterized as a novel GalNAc 6-O-**sulfotransferase** termed chondroitin 6-**sulfotransferase**-2 (Kitagawa, H., Fujita, M,, Itio, N., and Sugahara K, (2000) J. Biol Chem. 275, 21075-21080), We have coexpressed a **human** GST-5 cDNA with a **GlyCAM-1** /IgG fusion protein in COS-7 cells and observed fourfold enhanced [S-35]sulfate incorporation into this mucin acceptor. All mucin-associated [S-35]sulfate was incorporated as GlcNAc-6-sulfate or Gal beta1-->4GlcNAc-6-sulfate. GST-5 was also **expressed** in soluble epitope-tagged form and found to catalyze 6-O-sulfation of GlcNAc residues in synthetic acceptor structures. In particular, GST-B was found to catalyze 6-O-sulfation of beta -benzyl GlcNAc but not alpha- or beta -benzyl GalNAc, In the mouse genome we have found a homologous ORF that predicts a novel murine GlcNAc 6-O-**sulfotransferase** with 88% identity to the **human** enzyme. This gene was mapped to mouse chromosome X at band XA3.1-3.2. GST-5 is the newest member of an emerging family of carbohydrate 6-O-**sulfotransferases** that includes chondroitin g-**sulfotransferase** (GST-0), keratan-sulfate galactose 6-O-**sulfotransferase** (GST-1), the ubiquitously **expressed** GlcNAc 6-O-**sulfotransferase** (GST-S), high endothelial cell GlcNAc 6-O-**sulfotransferase** (GST-3), and intestinal GlcNAc 6-O-**sulfotransferase** (GST-4),

L19 ANSWER 7 OF 16 SCISEARCH COPYRIGHT 2004 THOMSON ISI on STN
ACCESSION NUMBER: 2000:516591 SCISEARCH
THE GENUINE ARTICLE: 330AU
TITLE: Molecular **cloning** and **expression** of two distinct **human** chondroitin 4-O-**sulfotransferases** that belong to the HNK-1 **sulfotransferase** gene family
AUTHOR: Hiraoka N; Nakagawa H; Ong E; Akama T O; Fukuda M N; Fukuda M

CORPORATE SOURCE: BURNHAM INST, CTR CANC RES, GLYCOBIOL PROGRAM, 10901 N TORREY PINES RD, LA JOLLA, CA 92037 (Reprint); BURNHAM INST, CTR CANC RES, GLYCOBIOL PROGRAM, LA JOLLA, CA 92037
COUNTRY OF AUTHOR: USA
SOURCE: JOURNAL OF BIOLOGICAL CHEMISTRY, (30 JUN 2000) Vol. 275, No. 26, pp. 20188-20196.
Publisher: AMER SOC BIOCHEMISTRY MOLECULAR BIOLOGY INC, 9650 ROCKVILLE PIKE, BETHESDA, MD 20814.
ISSN: 0021-9258.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: LIFE
LANGUAGE: English
REFERENCE COUNT: 63

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Using an **expression cloning** strategy, the cDNA encoding the **human** HNK-1 **sulfotransferase** (HNK-1ST) has been **cloned**. During this **cloning** we found that HNK-1ST and other Golgi-associated **sulfotransferases** **cloned** before share homologous sequences including the RDP motif (Ong, E., Yeh, J.-C., Ding, Y., Hindsgaul, O., and Fukuda, M. (1998) J. Biol. Chem, 223, 5190-5195). Using this conserved sequence in HNK-1ST as a probe, we identified two **expressed** sequence tags in EST data base which have 31.6 and 30.7% identity with HNK-1ST at the amino acid levels, **Expression** of these two full-length cDNAs failed to form HNK-1 glycan nor to add sulfate to **CD34** or NCAM. Surprisingly, proteins **expressed** by these cDNAs transferred sulfate to the C-4 position of N-acetylgalactosamine in chondroitin and desulfated dermatan sulfate, thus we named these two enzymes, chondroitin 4-O-sulfotransferas 1 and -2 (C4ST-1 and C4ST-2). Both C4ST-1 and C4ST-2, however, did not form 4,6-di-O-sulfated N-acetylgalactosamine when chondroitin sulfate C was used as an acceptor. Moreover, analysis of S-35-labeled dermatan sulfate formed by C4ST-1 indicate that sulfation preferentially took place in GlcA-->GalNAc unit than in IdoA-->GalNAc unit, suggesting that 4-O-sulfation at N-acetylgalactosamine may precede epimerization of glucuronic acid to iduronic acid during dermatan sulfate biosynthesis, Northern analysis demonstrated that the transcript for C4ST-1 is predominantly **expressed** in peripheral leukocytes and hematopoietic tissues while the C4ST-2 transcript is more widely **expressed** in various tissues. These results indicate C4ST-1 and C4ST-2 play complementary roles in chondroitin and dermatan sulfate synthesis in different tissues.

L19 ANSWER 8 OF 16 SCISEARCH COPYRIGHT 2004 THOMSON ISI on STN
ACCESSION NUMBER: 2000:728342 SCISEARCH
THE GENUINE ARTICLE: 356FA
TITLE: Differential carbohydrate recognition of two GlcNAc-6-**sulfotransferases** with possible roles in **L-selectin** ligand biosynthesis
AUTHOR: Cook B N; Bhakta S; Biegel T; Bowman K G; Armstrong J I; Hemmerich S; Bertozzi C R (Reprint)
CORPORATE SOURCE: UNIV CALIF BERKELEY, DEPT CHEM, BERKELEY, CA 94720 (Reprint); UNIV CALIF BERKELEY, DEPT CHEM, BERKELEY, CA 94720; UNIV CALIF BERKELEY, DEPT MOL & CELL BIOL, BERKELEY, CA 94720; ROCHE BIOSCI, DEPT MOL BIOL, PALO ALTO, CA 94304
COUNTRY OF AUTHOR: USA
SOURCE: JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, (13 SEP 2000) Vol. 122, No. 36, pp. 8612-8622.
Publisher: AMER CHEMICAL SOC, 1155 16TH ST, NW, WASHINGTON, DC 20036.
ISSN: 0002-7863.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: PHYS; LIFE
LANGUAGE: English

REFERENCE COUNT: 42

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Two **human** GlcNAc-6-**sulfotransferases**, CHST2 and HEC-GlcNAc6ST, have been recently identified as possible contributors to the inflammatory response by virtue of their participation in **L-selectin** ligand biosynthesis. Selective inhibitors would facilitate their functional elucidation and might provide leads for antiinflammatory therapy. Here we investigate the critical elements of a disaccharide substrate that are required for recognition by CHST2 and HEC-GlcNAc6ST. A panel of disaccharide analogues, bearing modifications to the pyranose rings and aglycon substituents, were synthesized and screened for substrate activity with each enzyme. Both GlcNAc-6-**sulfotransferases** required the 2-N-acetamido and 4-hydroxyl groups of a terminal GlcNAc residue for conversion to product. Both enzymes tolerated modifications to the reducing terminal pyranose. Key differences in recognition of an amide group in the aglycon substituent were observed, providing the basis for future glycomimetic inhibitor design.

L19 ANSWER 9 OF 16 EMBASE COPYRIGHT 2004 ELSEVIER INC. ALL RIGHTS RESERVED. on STN

ACCESSION NUMBER: 2000362283 EMBASE

TITLE: **Sulfotransferases** as targets for therapeutic intervention.

AUTHOR: Armstrong J.I.; Bertozzi C.R.

CORPORATE SOURCE: C.R. Bertozzi, Department Chemistry, University of California, Berkeley, CA 94720, United States. bertozzi@cchem.berkeley.edu

SOURCE: Current Opinion in Drug Discovery and Development, (2000) 3/5 (502-515).
Refs: 102
ISSN: 1367-6733 CODEN: CODDFF

COUNTRY: United Kingdom

DOCUMENT TYPE: Journal; General Review

FILE SEGMENT: 030 Pharmacology
037 Drug Literature Index

LANGUAGE: English

SUMMARY LANGUAGE: English

AB Sulfated biomolecules regulate a diverse array of normal and pathological cellular communication events. The participation of these bioconjugates in a variety of disease states has sparked interest in the enzyme class that installs the sulfate esters: the **sulfotransferases**. Recent advances in the **cloning** and characterization of **sulfotransferase** enzymes and our understanding of the role of sulfated biomolecules in disease states have prompted the search for specific **sulfotransferase** inhibitors. Evidence for the participation of sulfated carbohydrates and proteins in acute and chronic inflammation, tumor progression and microbial pathogenesis is presented herein, followed by a discussion of **sulfotransferase** mechanism and approaches to inhibiting **sulfotransferase** activity.

L19 ANSWER 10 OF 16 HCAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 1999:626310 HCAPLUS

DOCUMENT NUMBER: 131:254317

TITLE: **Cloning** of **human** and murine glycosylsulfotransferase-3 and its role in selectin-mediated binding events

INVENTOR(S): Bistrup, Annette; Rosen, Steven D.; Tangemann, Kirsten; Hemmerich, Stefan

PATENT ASSIGNEE(S): The Regents of the University of California, USA; Syntex, Incorporated

SOURCE: PCT Int. Appl., 60 pp.
CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9949018	A1	19990930	WO 1999-US4316	19990226
W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6265192	B1	20010724	US 1998-45284	19980320
US 6365365	B1	20020402	US 1998-190911	19981112
CA 2322779	AA	19990930	CA 1999-2322779	19990226
AU 9927945	A1	19991018	AU 1999-27945	19990226
AU 764852	B2	20030904		
EP 1062326	A1	20001227	EP 1999-908538	19990226
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
JP 2002507409	T2	20020312	JP 2000-537979	19990226

PRIORITY APPLN. INFO.:
US 1998-45284 A 19980320
US 1998-190911 A 19981112
WO 1999-US4316 W 19990226

AB Novel mammalian glycosylsulfotransferases **expressed** in high endothelial cells (GST-3) and polypeptides related thereto, as well as nucleic acid compns. encoding the same, are provided. The novel mammalian enzyme is a type 2 membrane protein having a relatively short transmembrane domain and a short N-terminal cytoplasmic tail. GST-3 is capable of sulfating selectin ligands, particularly **L-selectin** ligands., e.g., **GlyCam-1**, and is predicted to have N-acetylglucosamine-6-O-**sulfotransferase** activity. **Human** GST-3 is 386 amino acids in length, is highly glycosylated, and its **expression** is highly restricted; for example, **human** GST-3 is **expressed** in high endothelial cells (HEC) but not tonsillar lymphocytes or primary cultured **human** umbilical vein endothelial cells. Mouse Gst-3 is a 388 amino acid protein. Also provided are keratin sulfate galactosyl-6-**sulfotransferase** (KSGal6ST) homologs that are selectively **expressed** in HEC. The subject polypeptides and nucleic acid compns. find use in a variety of applications, including research, diagnostic, and therapeutic agent screening applications. Also provided are methods of inhibiting selectin-mediated binding events and methods of treating disease conditions assocd. therewith, particularly by administering an inhibitor of at least one of GST-3 or KSGal6ST, or homologs thereof.

REFERENCE COUNT: 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L19 ANSWER 11 OF 16 MEDLINE on STN
ACCESSION NUMBER: 1999439774 MEDLINE
DOCUMENT NUMBER: 99439774 PubMed ID: 10510083
TITLE: Sulfation of a high endothelial venule-**expressed** ligand for **L-selectin**. Effects on tethering and rolling of lymphocytes.
AUTHOR: Tangemann K; Bistrup A; Hemmerich S; Rosen S D
CORPORATE SOURCE: Department of Anatomy, Program in Immunology, and Cardiovascular Research Institute, University of California San Francisco, San Francisco, California 94143, USA.
CONTRACT NUMBER: R37GM23547 (NIGMS)
R01GM5741 (NIGMS)

SOURCE: JOURNAL OF EXPERIMENTAL MEDICINE, (1999 Oct 4) 190 (7) 935-42.
Journal code: 2985109R. ISSN: 0022-1007.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199911
ENTRY DATE: Entered STN: 20000111
Last Updated on STN: 20000111
Entered Medline: 19991104

AB During lymphocyte homing, **L-selectin** mediates the tethering and rolling of lymphocytes on high endothelial venules (HEVs) in secondary lymphoid organs. The **L-selectin** ligands on HEV are a set of mucin-like glycoproteins, for which glycosylation-dependent cell adhesion molecule 1 (**GlyCAM-1**) is a candidate. Optimal binding in equilibrium measurements requires sulfation, sialylation, and fucosylation of ligands. Analysis of **GlyCAM-1** has revealed two sulfation modifications (galactose [Gal]-6-sulfate and N-acetylglucosamine [GlcNAc]-6-sulfate) of sialyl Lewis x. Recently, three related **sulfotransferases** (keratan sulfate galactose-6-**sulfotransferase** [KSGal6ST], high endothelial cell N-acetylglucosamine-6-**sulfotransferase** [GlcNAc6ST], and **human** GlcNAc6ST) were **cloned**, which can generate Gal-6-sulfate and GlcNAc-6-sulfate in **GlyCAM-1**. Imparting these modifications to **GlyCAM-1**, together with appropriate fucosylation, yields enhanced rolling ligands for both peripheral blood lymphocytes and Jurkat cells in flow chamber assays as compared with those generated with exogenous fucosyltransferase. Either sulfation modification results in an increased number of tethered and rolling lymphocytes, a reduction in overall rolling velocity associated with more frequent pausing of the cells, and an enhanced resistance of rolling cells to detachment by shear. All of these effects are predicted to promote the overall efficiency of lymphocyte homing. In contrast, the rolling interactions of E-selectin transfectants with the same ligands are not affected by sulfation.

L19 ANSWER 12 OF 16 MEDLINE on STN
ACCESSION NUMBER: 1999264336 MEDLINE
DOCUMENT NUMBER: 99264336 PubMed ID: 10330415
TITLE: **Sulfotransferases** of two specificities function in the reconstitution of high endothelial cell ligands for **L-selectin**.
AUTHOR: Bistrup A; Bhakta S; Lee J K; Belov Y Y; Gunn M D; Zuo F R; Huang C C; Kannagi R; Rosen S D; Hemmerich S
CORPORATE SOURCE: Department of Anatomy and Program in Immunology, University of California, San Francisco, California 94143, USA.
CONTRACT NUMBER: GM57411 (NIGMS)
R37 GM23547 (NIGMS)
SOURCE: JOURNAL OF CELL BIOLOGY, (1999 May 17) 145 (4) 899-910.
Journal code: 0375356. ISSN: 0021-9525.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
OTHER SOURCE: GENBANK-AF131235; GENBANK-AF131236
ENTRY MONTH: 199907
ENTRY DATE: Entered STN: 19990730
Last Updated on STN: 19990730
Entered Medline: 19990721

AB **L-selectin**, a lectin-like receptor, mediates rolling of lymphocytes on high endothelial venules (HEVs) in secondary lymphoid organs by interacting with HEV ligands. These ligands consist of a complex of sialomucins, candidates for which are glycosylation- dependent

cell adhesion molecule 1 (**GlyCAM-1**), **CD34**, and podocalyxin. The ligands must be sialylated, fucosylated, and sulfated for optimal recognition by **L-selectin**. Our previous structural characterization of **GlyCAM-1** has demonstrated two sulfation modifications, Gal-6-sulfate and GlcNAc-6-sulfate in the context of sialyl Lewis x. We now report the **cloning** of a Gal-6-**sulfotransferase** and a GlcNAc-6-**sulfotransferase**, which can modify **GlyCAM-1** and **CD34**. The Gal-6-**sulfotransferase** shows a wide tissue distribution. In contrast, the GlcNAc-6-**sulfotransferase** is highly restricted to HEVs, as revealed by Northern analysis and in situ hybridization. **Expression** of either enzyme in Chinese hamster ovary cells, along with **CD34** and fucosyltransferase VII, results in ligand activity, as detected by binding of an **L-selectin**/IgM chimera. When coexpressed, the two **sulfotransferases** synergize to produce strongly enhanced chimera binding.

L19 ANSWER 13 OF 16 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
ACCESSION NUMBER: 1999:212549 BIOSIS
DOCUMENT NUMBER: PREV199900212549
TITLE: Culture characterization of differentiated high endothelial venule cells from **human** tonsils.
AUTHOR(S): Baekkevold, Espen S. [Reprint author]; Jahnsen, Frode L.; Johansen, Finn-Eirik; Bakke, Oddmund; Gaudernack, Gustav; Brandtzaeg, Per; Haraldsen, Guttorm
CORPORATE SOURCE: LIIPAT, Rikshospitalet, N-0027, Oslo, Norway
SOURCE: Laboratory Investigation, (March, 1999) Vol. 79, No. 3, pp. 327-336. print.
CODEN: LAINAW. ISSN: 0023-6837.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 26 May 1999
Last Updated on STN: 26 May 1999

AB High endothelial venules (HEV) are specialized vessels that support abundant lymphocyte emigration from peripheral blood into secondary lymphoid organs. HEV endothelial cells (HEVEC) exhibit particular structural and functional features, including secretion of the HEV-specific extracellular matrix protein hevin and an array of uniquely glycosylated counter-receptors for **L-selectin** **expressed** on lymphocytes. These ligands are collectively called the peripheral lymph node addressin (PNAd), originally defined by the monoclonal antibody MECA-79. PNAd **expression** was used to purify HEVEC by positive immunoselection from enzyme-digested **human** tonsils after negative immunoselection for other cells. Purified HEVEC maintained secretion of hevin and homogenous **expression** of intercellular adhesion molecule (ICAM)-1 (CD54), ICAM-2 (CD102), and CD31, at high levels following 8 days in culture. **Expression** of functional PNAd was maintained during the first 4 to 5 days of culture but decreased gradually and disappeared on day 8, while the **expression** of **CD34** remained strong. However, the **CD34** glycoform shifted toward the in situ phenotype of flat-walled vessels, suggesting that the observed loss of **L-selectin** binding determinants and MECA-79 antigen was due to down-regulation of the glycosyl- and sulfo-transferases essential for their **expression**. Our rapid and reproducible method to establish HEVEC cultures provides a useful mechanistic tool for identification of the factors that induce and maintain the HEV phenotype, as well as a source for isolation of HEV-specific genes.

L19 ANSWER 14 OF 16 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
ACCESSION NUMBER: 1999:175153 BIOSIS
DOCUMENT NUMBER: PREV199900175153
TITLE: **Cloning** and characterization of two **human**

carbohydrate **sulfotransferases** that are **expressed** in high endothelial venules and confer **L-selectin** binding activity onto **recombinant L-selectin** ligands.

AUTHOR(S): Bistrup, Annette; Tangemann, Kirsten; Bhakta, Sunil; Lee, Jin Kyu; Belov, Yevgeniy Y.; Gunn, Michael Dee; Hemmerich, Stefan; Rosen, Steven D.

CORPORATE SOURCE: Univ. California, San Francisco, CA 94143, USA

SOURCE: FASEB Journal, (March 12, 1999) Vol. 13, No. 4 PART 1, pp. A313. print.
Meeting Info.: Annual Meeting of the Professional Research Scientists for Experimental Biology 99. Washington, D.C., USA. April 17-21, 1999.
CODEN: FAJOEC. ISSN: 0892-6638.

DOCUMENT TYPE: Conference; (Meeting)
Conference; Abstract; (Meeting Abstract)

LANGUAGE: English

ENTRY DATE: Entered STN: 5 May 1999
Last Updated on STN: 5 May 1999

L19 ANSWER 15 OF 16 MEDLINE on STN

ACCESSION NUMBER: 1999361934 MEDLINE

DOCUMENT NUMBER: 99361934 PubMed ID: 10435581

TITLE: A novel, high endothelial venule-specific **sulfotransferase expresses** 6-sulfo sialyl Lewis(x), an **L-selectin** ligand displayed by **CD34**.

AUTHOR: Hiraoka N; Petryniak B; Nakayama J; Tsuboi S; Suzuki M; Yeh J C; Izawa D; Tanaka T; Miyasaka M; Lowe J B; Fukuda M

CORPORATE SOURCE: Glycobiology Program, Cancer Research Center, The Burnham Institute, La Jolla, California 92037, USA.

CONTRACT NUMBER: PO1AI33189 (NIAID)
PO1CA71932 (NCI)

SOURCE: IMMUNITY, (1999 Jul) 11 (1) 79-89.
Journal code: 9432918. ISSN: 1074-7613.

PUB. COUNTRY: United States

DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)

LANGUAGE: English

FILE SEGMENT: Priority Journals

OTHER SOURCE: GENBANK-AF109155

ENTRY MONTH: 199908

ENTRY DATE: Entered STN: 19990820
Last Updated on STN: 19990820
Entered Medline: 19990811

AB **L-selectin** mediates lymphocyte homing by facilitating lymphocyte adhesion to unique carbohydrate ligands, sulfated sialyl Lewis(x), which are **expressed** on high endothelial venules (HEV) in secondary lymphoid organs. The nature of the **sulfotransferase** (s) that contribute to sulfation of such **L-selectin** counterreceptors has been uncertain. We herein describe a novel **L-selectin** ligand **sulfotransferase**, termed LSST, that directs the synthesis of the 6-sulfo sialyl Lewis(x) on **L-selectin** counterreceptors **CD34**, **GlyCAM-1**, and **MAdCAM-1**. LSST is predominantly **expressed** in HEV and exhibits striking catalytic preference for core 2-branched mucin-type O-glycans as found in natural **L-selectin** counterreceptors. LSST enhances **L-selectin**-mediated adhesion under shear compared to nonsulfated controls. LSST therefore corresponds to an HEV-specific **sulfotransferase** that contributes to the biosynthesis of **L-selectin** ligands required for lymphocyte homing.

L19 ANSWER 16 OF 16 SCISEARCH COPYRIGHT 2004 THOMSON ISI on STN

ACCESSION NUMBER: 1998:700521 SCISEARCH

THE GENUINE ARTICLE: 117KA

TITLE: **Human** N-acetylglucosamine-6-O-**sulfotransferase** involved in the biosynthesis of 6-sulfo sialyl Lewis X: Molecular **cloning**, chromosomal mapping, and **expression** in various organs and tumor cells

AUTHOR: Uchimura K; Muramatsu H; Kaname T; Ogawa H; Yamakawa T; Fan Q W; Mitsuoka C; Kannagi R; Habuchi O; Yokoyama I; Yamamura K; Ozaki T; Nakagawara A; Kadomatsu K; Muramatsu T (Reprint)

CORPORATE SOURCE: NAGOYA UNIV, SCH MED, DEPT BIOCHEM, SHOWA KU, 65 TSURUMAI CHO, NAGOYA, AICHI 4668550, JAPAN (Reprint); NAGOYA UNIV, SCH MED, DEPT BIOCHEM, SHOWA KU, NAGOYA, AICHI 4668550, JAPAN; NAGOYA UNIV, SCH MED, DEPT SURG 2, SHOWA KU, NAGOYA, AICHI 4668550, JAPAN; NAGOYA UNIV, SCH MED, DEPT INTERNAL MED 3, SHOWA KU, NAGOYA, AICHI 4668550, JAPAN; KUMAMOTO UNIV, SCH MED, INST MOL EMBRYOL & GENET, DEPT DEV GENET, KUMAMOTO 8620976, JAPAN; AICHI CANC CTR, RES INST, PROGRAM EXPT PATHOL, NAGOYA, AICHI 4640021, JAPAN; AICHI UNIV EDUC, DEPT LIFE SCI, KARIYA, AICHI 4488542, JAPAN; CHIBA CANC CTR, INST RES, DIV BIOCHEM, CHUOH KU, CHIBA 2600801, JAPAN

COUNTRY OF AUTHOR: JAPAN

SOURCE: JOURNAL OF BIOCHEMISTRY, (SEP 1998) Vol. 124, No. 3, pp. 670-678.
Publisher: JAPANESE BIOCHEMICAL SOC, ISHIKAWA BLDG-3F, 25-16 HONGO-5-CHOME, BUNKYO-KU, TOKYO 113, JAPAN.
ISSN: 0021-924X.

DOCUMENT TYPE: Article; Journal

FILE SEGMENT: LIFE

LANGUAGE: English

REFERENCE COUNT: 35

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB N-Acetylglucosamine-6-O-**sulfotransferase** catalyzes the transfer of sulfate from 3'-phosphoadenosine 5'-phosphosulfate to position 6 of a non-reducing N-acetylglucosamine (GlcNAc) residue. We have **cloned human** GlcNAc-6-O-**sulfotransferase** cDNA, based on the sequence homology to **cloned** cDNA of mouse GlcNAc-6-O-**sulfotransferase**. The predicted protein sequence of the **human** enzyme was highly homologous to that of the mouse enzyme; in the 363 amino acid stretch of the catalytic region, the two proteins were nearly identical except for conservative changes in 3 amino acid residues. The **expressed** enzyme transferred sulfate to GlcNAc beta 1-3Gal beta 1-4GlcNAc beta 1-3Gal beta 1-4GlcNAc. Co-transfection of the enzyme cDNA and fucosyltransferase VII cDNA into COS-7 cells resulted in cell surface **expression** of 6-sulfo sialyl Lewis X. Fluorescence irt situ hybridization analysis revealed that the GlcNAc-6-O-**sulfotransferase** gene is located on **human** chromosome 7q31. mRNA of the **human** enzyme was strongly **expressed** in the bone marrow, peripheral blood leukocytes, spleen, brain, spinal cord, ovary, and placenta, and moderate levels of **expression** were observed in many organs including lymph nodes and thymus. In situ hybridization with the mouse system showed that the transcript was localized in specific regions of the brain, i.e. pyramidal cells in the CA3 subregion of the hippocampus, cerebellar nucleus and Purkinje cells. Among **human** tumor cells, strong **expression** of the mRNA was found in MOLT-4 and Jarkat lymphoblastic leukemia cells, Raji lymphoma cells, K-562 chronic myelogeneous leukemia cells, U251 glioma cells, and G361 melanoma cells. Carbohydrate structures synthesized by the **sulfotransferase** may be involved in various aspects of the differentiation and behavior of blood cells, their progenitor cells, and neurons in the central nervous system.

```
=> d his

     (FILE 'HOME' ENTERED AT 11:10:43 ON 07 JAN 2004)

     FILE 'MEDLINE, EMBASE, BIOSIS, BIOTECHDS, SCISEARCH, HCAPLUS, NTIS,
     LIFESCI' ENTERED AT 11:11:16 ON 07 JAN 2004
L1            11 S GLYCOSYL (A) SULFOTRANSFERASE?
L2             8 DUP REM L1 (3 DUPLICATES REMOVED)
L3             2 S "GST4 ALPHA"
L4             1 DUP REM L3 (1 DUPLICATE REMOVED)
L5            53 S "GST4"
L6            10 S HUMAN (A)L5
L7             2 DUP REM L6 (8 DUPLICATES REMOVED)
L8         13789 S SULFOTRANSFERASE?
L9          5827 S HUMAN AND L8
L10      6311680 S CLON? OR EXPRESS? OR RECOMBINANT
L11         2771 S L9 AND L10
L12        13955 S "L-SELECTIN"
L13        19920 S "P-SELECTIN"
L14        31224 S L12 OR L13
L15          124 S L11 AND L14
L16           77 DUP REM L15 (47 DUPLICATES REMOVED)
L17        59143 S "GLYCAM-1" OR "CD34" OR "MADCAM-1" OR "SGP200"
L18           16 S L16 AND L17
L19           16 DUP REM L18 (0 DUPLICATES REMOVED)

=> e rosen s/au
E1             1     ROSEN RT/AU
E2             2     ROSEN RUDOLPH A/AU
E3          2356 --> ROSEN S/AU
E4            20     ROSEN S A/AU
E5             8     ROSEN S B/AU
E6           146     ROSEN S C/AU
E7           740     ROSEN S D/AU
E8             8     ROSEN S D */AU
E9             1     ROSEN S D C/AU
E10           53     ROSEN S E/AU
E11           13     ROSEN S F/AU
E12          145     ROSEN S G/AU

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L20         2356 "ROSEN S"/AU

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E2             1     LEE IYUEN HUAN/AU
E3         13300 --> LEE J/AU
E4             3     LEE J */AU
E5          1861     LEE J A/AU
E6             2     LEE J A */AU
E7             3     LEE J A B/AU
E8            26     LEE J A C/AU
E9             1     LEE J A E/AU
E10            1     LEE J A F/AU
E11          146     LEE J A H/AU
E12            1     LEE J A I/AU

=> s e3
L21        13300 "LEE J"/AU

=> e hemmerich s/au
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E2             1     HEMMERICH ROLF H/AU
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E5            2     HEMMERICH W/AU
E6            1     HEMMERICK GEO/AU
E7            1     HEMMERICK PETER/AU
E8            8     HEMMERLE A/AU
E9            9     HEMMERLE A V/AU
E10           6     HEMMERLE ANKE/AU
E11           9     HEMMERLE C/AU
E12           7     HEMMERLE CHRISTINE/AU

=> s e3
L22         118 "HEMMERICH S"/AU

=> d his

     (FILE 'HOME' ENTERED AT 11:10:43 ON 07 JAN 2004)

     FILE 'MEDLINE, EMBASE, BIOSIS, BIOTECHDS, SCISEARCH, HCAPLUS, NTIS,
     LIFESCI' ENTERED AT 11:11:16 ON 07 JAN 2004
L1            11 S GLYCOSYL (A) SULFOTRANSFERASE?
L2             8 DUP REM L1 (3 DUPLICATES REMOVED)
L3             2 S "GST4 ALPHA"
L4             1 DUP REM L3 (1 DUPLICATE REMOVED)
L5            53 S "GST4"
L6            10 S HUMAN (A)L5
L7             2 DUP REM L6 (8 DUPLICATES REMOVED)
L8         13789 S SULFOTRANSFERASE?
L9          5827 S HUMAN AND L8
L10      6311680 S CLON? OR EXPRESS? OR RECOMBINANT
L11         2771 S L9 AND L10
L12        13955 S "L-SELECTIN"
L13        19920 S "P-SELECTIN"
L14        31224 S L12 OR L13
L15          124 S L11 AND L14
L16           77 DUP REM L15 (47 DUPLICATES REMOVED)
L17        59143 S "GLYCAM-1" OR "CD34" OR "MADCAM-1" OR "SGP200"
L18           16 S L16 AND L17
L19           16 DUP REM L18 (0 DUPLICATES REMOVED)
                 E ROSEN S/AU
L20         2356 S E3
                 E LEE J/AU
L21        13300 S E3
                 E HEMMERICH S/AU
L22          118 S E3

=> s l21 or l20 or l22
L23       15770 L21 OR L20 OR L22

=> s l5 and l23
L24            3 L5 AND L23

=> dup rem l24
PROCESSING COMPLETED FOR L24
L25            1 DUP REM L24 (2 DUPLICATES REMOVED)

=> d all

L25  ANSWER 1 OF 1     MEDLINE on STN                    DUPLICATE 1
AN   2001205848     MEDLINE
DN   21096027   PubMed ID: 11181564
TI   Chromosomal localization and genomic organization for the galactose/
     N-acetylgalactosamine/N-acetylglucosamine 6-O-sulfotransferase gene
     family.
```

AU **Hemmerich S**; Lee J K; Bhakta S; Bistrup A; Ruddle N R; Rosen S D
CS Department of Respiratory Diseases, Roche Bioscience, Palo Alto, CA 94304, USA.
NC RO1GM5741 (NIGMS)
SO GLYCOBIOLOGY, (2001 Jan) 11 (1) 75-87.
Journal code: 9104124. ISSN: 0959-6658.
CY England: United Kingdom
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
OS GENBANK-AF176838; GENBANK-AF280086; GENBANK-AF280087; GENBANK-AF280088; GENBANK-AF280089; GENBANK-AI824100
EM 200106
ED Entered STN: 20010611
Last Updated on STN: 20010611
Entered Medline: 20010607
AB The galactose/N-acetylgalactosamine/N-acetylglucosamine 6-O-sulfotransferases (GSTs) are a family of Golgi-resident enzymes that transfer sulfate from 3'phosphoadenosine 5'phospho-sulfate to the 6-hydroxyl group of galactose, N-acetylgalactosamine, or N-acetylglucosamine in nascent glycoproteins. These sulfation modifications are functionally important in settings as diverse as cartilage structure and lymphocyte homing. To date six members of this gene family have been described in human and in mouse. We have determined the chromosomal localization of these genes as well as their genomic organization. While the broadly expressed enzymes implicated in proteoglycan biosynthesis are located on different chromosomes, the highly tissue specific enzymes GST-3 and 4 are encoded by genes located both in band q23.1--23.2 on chromosome 16. In the mouse, both genes reside in the syntenic region 8E1 on chromosome 8. This cross-species conserved clustering is suggestive of related functional roles for these genes. The human **GST4** locus actually contains two highly similar open reading frames (ORF) that are 50 kb apart and encode two highly similar enzyme isoforms termed GST-4 alpha and GST-4 beta. All genes except GST0 (chondroitin 6-O-sulfotransferase) contain intron-less ORFs. With one exception these are fused directly to sequences encoding the 3' untranslated regions (UTR) of the respective mature mRNAs. The 5' UTRs of these mRNAs are usually encoded by a number of short exons 5' of the respective ORF. 5'UTRs of the same enzyme expressed in different cell types are sometimes derived from different exons located upstream of the ORF. The genomic organization of the GSTs resembles that of certain glycosyltransferase gene families.
CT Check Tags: Animal; Human; Support, Non-U.S. Gov't; Support, U.S. Gov't, P.H.S.
Amino Acid Sequence
Base Sequence
Chromosome Mapping
Chromosomes, Artificial, Bacterial
*Chromosomes, Human, Pair 16
Cloning, Molecular
DNA, Complementary
Glutathione Transferase: GE, genetics
In Situ Hybridization, Fluorescence
Mice
Molecular Sequence Data
CN 0 (Chromosomes, Artificial, Bacterial); 0 (DNA, Complementary); EC 2.5.1.18 (Glutathione Transferase)

=> d his

(FILE 'HOME' ENTERED AT 11:10:43 ON 07 JAN 2004)

FILE 'MEDLINE, EMBASE, BIOSIS, BIOTECHDS, SCISEARCH, HCAPLUS, NTIS,

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     LIFESCI' ENTERED AT 11:11:16 ON 07 JAN 2004
L1           11 S GLYCOSYL (A) SULFOTRANSFERASE?
L2            8 DUP REM L1 (3 DUPLICATES REMOVED)
L3            2 S "GST4 ALPHA"
L4            1 DUP REM L3 (1 DUPLICATE REMOVED)
L5           53 S "GST4"
L6           10 S HUMAN (A)L5
L7            2 DUP REM L6 (8 DUPLICATES REMOVED)
L8        13789 S SULFOTRANSFERASE?
L9         5827 S HUMAN AND L8
L10     6311680 S CLON? OR EXPRESS? OR RECOMBINANT
L11        2771 S L9 AND L10
L12       13955 S "L-SELECTIN"
L13       19920 S "P-SELECTIN"
L14       31224 S L12 OR L13
L15         124 S L11 AND L14
L16          77 DUP REM L15 (47 DUPLICATES REMOVED)
L17       59143 S "GLYCAM-1" OR "CD34" OR "MADCAM-1" OR "SGP200"
L18          16 S L16 AND L17
L19          16 DUP REM L18 (0 DUPLICATES REMOVED)
                E ROSEN S/AU
L20        2356 S E3
                E LEE J/AU
L21       13300 S E3
                E HEMMERICH S/AU
L22         118 S E3
L23       15770 S L21 OR L20 OR L22
L24           3 S L5 AND L23
L25           1 DUP REM L24 (2 DUPLICATES REMOVED)
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	Issue Date	Pages	Document ID	Title
1	20030501	78	US 20030082511 A1	Identification of modulatory molecules using inducible promoters
2	20020214	22	US 20020019019 A1	Method and apparatus for assaying a drug candidate to estimate a pharmacokinetic parameter associated therewith

	Issue Date	Pages	Document ID	Title
1	20030911	34	US 20030170263 A1	Expression system
2	20030501	78	US 20030082511 A1	Identification of modulatory molecules using inducible promoters
3	20030213	33	US 20030031681 A1	Combined growth factor-deleted and thymidine kinase-deleted vaccinia virus vector
4	20020214	22	US 20020019019 A1	Method and apparatus for assaying a drug candidate to estimate a pharmacokinetic parameter associated therewith
5	20000711	14	US 6088277 A	Read only memory capable of realizing a high-speed read operation
6	19861216	22	US 4630188 A	Multi-zone ramp system for digital pulse generator and large scale integrated chip embodying the same
7	19821102	9	US 4357584 A	Acoustic wave devices

	Issue Date	Pages	Document ID	Title
1	20040101	106	US 20040002067 A1	Breast cancer progression signatures
2	20030814	278	US 20030154032 A1	Methods and compositions for diagnosing and treating rheumatoid arthritis
3	20030417	12	US 20030073100 A1	Method of identifying renalgenerative agents using differential gene expression
4	20021107	36	US 20020164748 A1	Glycosyl sulfotransferase-3
5	20020604	17	US 6399358 B1	Human gene encoding human chondroitin 6-sulfotransferase
6	20020402	38	US 6365365 B1	Method of determining whether an agent modulates glycosyl sulfotransferase-3

	Issue Date	Pages	Document ID	Title
1	20030731	104	US 20030143589 A1	Drug metabolizing enzymes
2	20030306	202	US 20030044783 A1	Human genes and gene expression products
3	20021107	36	US 20020164748 A1	Glycosyl sulfotransferase-3
4	20011213	27	US 20010051370 A1	Glycosyl sulfotransferase-3
5	20021105	179	US 6476195 B1	Secreted protein HNFGF20
6	20020402	38	US 6365365 B1	Method of determining whether an agent modulates glycosyl sulfotransferase-3
7	20010724	27	US 6265192 B1	Glycosly sulfortransferase-3

	L #	Hits	Search Text
1	L1	385296	human
2	L3	2	l1 same l2
3	L4	0	"glycosyl sulfotransferase$2"
4	L5	0	"sulfotransferase$2"
5	L2	7	"gst4"
6	L6	537	sulfotransferase$2
7	L7	203	l1 same l6
8	L8	588758	clon$3 or express$3 or recombinant
9	L9	132	l7 same l8
10	L10	3301	selectin
11	L11	6	l9 same l10
12	L12	2665	rosen.in.

	L #	Hits	Search Text
13	L13	55556	lee.in.
14	L14	68	hemmerich.in.
15	L15	58256	l12 or l13 or l14
16	L16	7	l9 and l15